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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Arch D. Robison

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EXAMINER

KISS, ERIC B

ART UNIT

PAPER NUMBER

2192

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

01/18/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/693,156	Applicant(s) ROBISON, ARCH D.	
	Examiner Eric B. Kiss	Art Unit 2192	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 November 2006.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 10-19 and 21-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 10-19 and 21-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The reply filed November 8, 2006, has been received and entered. Claims 10-19 and 21-27 are pending.

Response to Amendment

2. Applicant's amendments to the specification appropriately address the objection based on improper usage of trademarks. Accordingly, this objection is withdrawn in view of Applicant's amendments.

3. Applicant's amendments to claim 21 appropriately address the objection to claim 21 based on a minor informality. Accordingly, this objection is withdrawn in view of Applicant's amendment.

4. Applicant's amendments to the claims do not appropriately address the rejections under 35 U.S.C. §§ 101 and 112. Accordingly, these rejections are maintained as discussed in more detail below.

Response to Arguments

5. Applicant's arguments filed November 8, 2006, have been fully considered but they are not persuasive.

Although applicant has removed the term "rarely taken" from the claims (Remarks at 16-17,) it is noted that the substituted term, "infrequent" presents similar problems necessitating rejection under 35 U.S.C. §§ 101 and 112 (see below). Specifically, without a description of how one attempting to practice the recited methods may reasonably determine how to qualify a control-flow branch as infrequent, the prescribed methods do not provide for assured, repeatable results, and cannot be said to be concrete. Further, the term "infrequent" is not defined by the

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claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Applicant's allegation that the claims provide a tangible result is not persuasive. As noted below, the "result" of claims 10-19 and 21-27 appears to be a series of calculations, or at best, the insertion of instructions into an abstraction of a computer program (see, for example, claim 21, lines 14-16). The claims do not suggest as a result of practicing the claimed methods that any real-world change would occur in an existing computer program capable of being installed, executed, or otherwise conveyed in a manner supporting a practical application as a tangible result that would enable any intended usefulness to be realized.

Applicant's arguments regarding the term "prologue" are unpersuasive in view of the explicit definition of the term in the specification ("zero or more instructions that perform some housekeeping." (Specification at p. 11, lines 20-21 (emphasis added).) It is unclear whether the steps involving the term "prologue" requires any action or necessarily further limit the claims.

Applicant's arguments regarding the disclosure of *Bodik* are addressed specifically in the rejection under 35 U.S.C. § 102(b) as set forth below.

Claim Rejections - 35 USC § 101

6. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7. Claims 10-19 and 21-27 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

A claim that requires one or more acts to be performed defines a process. However, not all processes are statutory under 35 U.S.C. § 101. To be statutory, a claimed process must either: (A) result in a physical transformation for which a practical application is either disclosed in the specification or would have been known to a skilled artisan, or (B) be limited to a practical application which produces a useful, tangible, and concrete result. *See Diamond v. Diehr*, 450 U.S. 175, 183-84, 209 USPQ 1, 9 (1981) (quoting *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876)) (“A [statutory] process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence.”). *See also In re Alappat*, 33 F.3d 1526, 1543, 31 USPQ2d 1545, 1556-57 (quoting *Diehr*, 450 U.S. at 192, [209 USPQ at 10]).

In *State Street*, the Federal Circuit examined some of its prior section 101 cases, observing that the claimed inventions in those cases were each for a “practical application of an abstract idea” because the elements of the invention operated to produce a “useful, concrete and tangible result.” *State St. Bank & Trust v. Signature Fin. Group*, 149 F.3d 1368, 1373-74, 47 USPQ2d 1596, 1601-02 (Fed Cir. 1998). For example, the court in *State Street* noted that the claimed invention in *Alappat* “constituted a practical application of an abstract idea (a mathematical algorithm, formula, or calculation), because it produced ‘a useful, concrete and tangible result’—the smooth waveform.” *Id.* Similarly, the claimed invention in *Arrhythmia* “constituted a practical application of an abstract idea (a mathematical algorithm, formula, or calculation), because it corresponded to a useful, concrete and tangible thing—the condition of a

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patient's heart.” *Id.* (citing *Arrhythmia Research Tech. V. Corazonix Corp.*, 958 F.2d 1053, 22 USPQ2d 1033 (Fed. Cir. 1992)).

In determining whether the claim is for a “practical application,” the focus is not on whether the steps taken to achieve a particular result are useful, tangible and concrete, but rather that the final result is “useful, tangible and concrete.” The Federal Circuit further ruled that it is of little relevance whether a claim is directed to a machine or process for the purpose of a § 101 analysis. *AT&T Corp. v. Excel Commc'ns*, 172 F.3d 1352, 1358, 50 USPQ2d 1447, 1451 (Fed. Cir. 1999).

Claims 10-19 and 22-24 require a determination of whether a branch in a control-flow graph is “infrequent.” *See* Claim 10 at line 4 and Claim 22 at lines 4-5. The specification fails to provide a description of how such determination may be done, other than indicating a general presumption that exceptions rarely occur. (*See, e.g.*, Specification at p. 5, lines 13-15.) Without a description of how one attempting to practice the recited methods may reasonably determine how to qualify a control-flow branch as infrequent, the prescribed methods do not provide for assured, repeatable results, and cannot be said to be concrete.

Further, the “result” of claims 10-19 and 21-27 appears to be a series of calculations, or at best, the insertion of instructions into an abstraction of a computer program (see, for example, claim 21, lines 14-16). The claims do not suggest as a result of practicing the claimed methods that any real-world change would occur in an existing computer program capable of being installed, executed, or otherwise conveyed in a manner supporting a practical application as a tangible result that would enable any intended usefulness to be realized.

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8. To expedite a complete examination of the instant application, the claims rejected under 35 U.S.C. §101 (non-statutory) above are further rejected as set forth below in anticipation of Applicant amending these claims to place them within the four statutory categories of invention.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 10-19 and 21-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "infrequent" in claims 10 and 22 is a relative term which renders the claims indefinite. The term "infrequent" is not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The limitations regarding calculating down-safety are unclear in view of the inclusion of this relative term.

The insertion of a "prologue," as recited by claims 13 and 21 is unclear in view of the specification describing such a prologue as, "zero or more instructions that perform some housekeeping." (Specification at p. 11, lines 20-21 (emphasis added).) It is unclear whether this step requires any action or necessarily further limits the claims, and accordingly, this step further renders claims 13 and 21-27 indefinite.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 10 is rejected under 35 U.S.C. 102(b) as being anticipated by Rastislav Bodik, et al., "Complete Removal of Redundant Expressions," In Proceedings of the ACM SIGPLAN '98 Conference on Programming Language Design and Implementation, pages 1-14, June 1998 (hereinafter "Bod1998").

As per claim 10, Bod1998 discloses:

speculatively computing down-safety (anticipability) by ignoring infrequent branches in a control-flow graph (see, e.g, section 2, on pp. 3-5, describing the calculation of anticipability and availability; section 3.3 on p. 8, describing disregarding of infrequent paths in computing the benefit of duplicating a region for *Must-Must* paths (Must-available entry edge and Must-anticipated exit edge); in the interest of compact prosecution in view of the rejection of claim 10 under 35 U.S.C. § 112, second paragraph (above), "infrequent" is here interpreted to mean the same thing as the infrequent paths, determined by path profiles, disclosed by Bod1998 on p. 8);

computing up-safety (availability) using the results of the down-safety calculation to determine where operations are speculatively available (see, e.g, section 2, on pp. 3-5, describing the calculation of anticipability and availability);

using the down-safety and up-safety to determine instructions to be inserted into the routine that set components in a stack, the stack to handle cleanup instructions for the routine

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(see, p. 11, last two paragraphs; p. 12, paragraph 2 (. . . pushes new entries on the stacks to initiate a reduction of a new interval and also marks the loop entry node to stop when back substitution collected cyclic dependences along all cyclic paths on the back edge edge (y, x).) ; and

removing edges from one or more exceptional paths in the routine to eliminate the partial redundancy in the routine, the edges to be removed having purposes that are performed by the instructions (see, for example, the first two paragraphs of section 2 on p. 3 (. . . Code motion PRE eliminates the redundancy by hoisting the redundant computation along all paths until it reaches an edge where the reused value is available along either all paths or no paths. In the former case, the computation is removed . . .).

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Eric B. Kiss whose telephone number is (571) 272-3699. The Examiner can normally be reached on Tue. - Fri., 7:00 am - 4:30 pm. The Examiner can also be reached on alternate Mondays.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Tuan Dam, can be reached on (571) 272-3695. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any inquiry of a general nature should be directed to the TC 2100 Group receptionist: 571-272-2100.

EBK / EBK
January 15, 2007



TUAN DAM
SUPERVISORY PATENT EXAMINER